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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/053,865 | 01/18/2002 | Mario Saggio | 00-CT-320 | 5366 |

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| EXAMINER |
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IM, JUNGHWA M

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| ART UNIT | PAPER NUMBER |
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2811

DATE MAILED: 09/11/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/053,865

Applicant(s)

SAGGIO ET AL.

Examiner

Junghwa M. Im

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6. 6) ☐ Other:

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities:

On page 7, line 4, “/cm⁻²” should be corrected to /cm² or cm⁻².

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 5 recites the doped regions comprise doped regions that equalize the charges in the semiconductor material layer.

There is not a clear disclosure over what it means to equalize the charges in the semiconductor material layer, of how one of ordinary skill would accomplish such a result, or of how one of ordinary skill would know when “charges” have been “equalized”.

Also, a term, “the charges” is not clear. Are these mobile charge carriers, fixed charges in the lattice, or both? What is meant by “equalizing” the “charges”?

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites a substrate region of a first conductive type formed “in” a semiconductor material layer of the same conductivity type. Figures show a substrate region is formed under or below the a semiconductor material layer.

It is not clear what is meant by a substrate region formed “in” a semiconductor material layer.

Claim 6 recites the limitation of "said" body region in claim 1.

There is insufficient antecedent basis for this limitation in the claim. Claim 1 does not recite a “body region”.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in-
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-6, 8 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by the disclosed prior art to Werner et al. (U.S. Pat. No. 6,184,545)

Regarding claim 1, Werner et al. show, in Fig. 2, Schottky barrier diode comprising:
a substrate region (5) of a first conductive type (n) formed in a semiconductor material layer (4) of the same conductivity type (n);

a metal layer (2); and

at least two doped regions (8 or 10) of a second conductive type (p) formed on said semiconductor material layer, each one of said doped regions being disposed under said metal layer and being separated from the other doped region by the portions of said semiconductor layer.

Regarding claim 2, Werner et al. teach that conducting-state current flow is through zones (9), so zones must have a lower resistance than the doped regions (8), because current flows along the lowest resistance path (col. 4, lines 19-21).

Regarding claim 3, Werner et al. show, in Fig. 2, the substrate comprises a doping value (n^+) higher than a doping value of the semiconductor material layer (n^-).

Regarding claim 4, Werner et al. show, in Fig. 2, the doped regions comprises respective body region (8).

Regarding claim 5, Werner et al. show the doped regions comprise doped regions that equalize the charges in the semiconductor material (col. 4, line 37-43).

The "charges" are read as mobile charge carriers which are "equalized" because the

reference teaches that there are no positive carriers and no negative carriers.

Regarding claim 6, Werner et al. show, in Fig. 2, the body regions (8) comprises heavily doped body regions (10) having the same conductivity type (p) of the doped regions.

Regarding claim 8, Werner et al. show, in Fig. 2, the doped body regions (8) comprise P-type doped regions.

Regarding claim 9, Werner et al. show, in Fig. 2, the semiconductor material layer comprises an N-type semiconductor material layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner et al.

Claim 1 has been discussed previously.

Regarding claim 7, Werner et al. show the most aspect of pending claim except that the semiconductor material comprises a resistivity value lower than five ohm-cm for a breakdown voltage higher than 200V.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have an intended resistivity value for a breakdown voltage recited in pending claim, since it would have been held that where the general conditions of a claim are disclosed

in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233

Higher breakdown voltage would have been obvious in order to allow device operation at higher voltages.

Claim Rejections - 35 USC § 102

Claims 1-9 are rejected under 35 U.S.C. 102(e) as being anticipated by the disclosed prior art to Bridge-Butler et al. (EP 0975024)

Regarding claim 1, Bridge-Butler et al. show, in Fig. 1, Schottky barrier diode comprising:

a substrate region (31) of a first conductive type (n) formed in a semiconductor material layer (32a) of the same conductivity type (n);

a metal layer (37); and

at least two doped regions (33a) of a second conductive type (p) formed on said semiconductor material layer, each one of said doped regions being disposed under said metal layer and being separated from the other doped region by the portions of said semiconductor layer.

Regarding claim 2, as noted above, the current flow is along the path of the lowest resistance.

Regarding claim 3, Bridge-Butler et al. show, in Fig. 1, the substrate comprises a doping value (n^+) higher than a doping value of the semiconductor material layer (n^-).

Regarding claim 4, Bridge-Butler et al. show, in Fig. 1, the doped regions comprises respective body region (32).

Regarding claim 5, Bridge-Butler et al. teach that the device includes substrate region (32) that is depleted in the OFF state (Abstract)

Regarding claim 6, Bridge-Butler et al. show, in Fig. 1, the body regions (33a) comprises heavily doped body regions (32) having the same conductivity type (p) of the doped regions.

Regarding claim 7, Bridge-Butler et al. teaches a 300V device. The material layer (32a) “comprises” regions such as 32b or 34 which have impurity concentrations high enough to give a resistivity of less than 5ohm-cm (col. 10, lines 16-44).

Regarding claim 8, Bridge-Butler et al. show, in Fig. 1, the doped body regions (32) comprise P-type doped regions.

Regarding claim 9, Bridge-Butler et al. show, in Fig. 1, the semiconductor material layer (32a) comprises an N-type semiconductor material layer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (703) 305-3998. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JMI

September 8, 2002


Sara Crane
Primary Examiner